

In the Claims:

1-22. (Cancelled)

23. (Currently Amended) A method for illuminating a semiconductor structure having a topmost photoresist layer, the method ~~comprising~~; comprising:

 providing a semiconductor structure having a photoresist layer, the photoresist layer having a thickness of less than 5000 angstroms formed on a surface thereof;

 introducing an immersion fluid into a space between an optical surface and the photoresist layer; and

 directing optical energy through the immersion fluid and onto the photoresist layer after the photoresist layer has been completely diffused with the immersion fluid.

24. (Original) The method of claim 23 wherein the immersion fluid comprises water.

25. (Original) The method of claim 23 wherein the optical energy comprises light having a wavelength of less than about 450 nm.

26. (Original) The method of claim 23 wherein the optical surface comprises silicon oxide.

27. (Original) The method of claim 23 wherein the optical surface comprises calcium fluoride.

28. (Currently Amended) The method of claim 23 wherein the photoresist layer comprises a chemically amplified photoresist layer.

29. (Original) The method of claim 23 wherein the immersion fluid is in contact with a portion of the photoresist layer.

30. (Original) The method of claim 23 wherein the semiconductor structure is immersed in the immersion fluid.

31. (Original) The method of claim 23 further comprising a stage underlying the semiconductor structure.

32. (Original) The method of claim 31 wherein the stage is immersed in the immersion fluid.

33. (Currently Amended) The method of claim 23 further comprising developing the photoresist layer.

34. (Currently Amended) The method of claim 33 wherein developing the photoresist layer comprises immersing the photoresist layer in a tetramethylammonia hydroxide solution.

35-36. (Canceled)

37. (Currently Amended) A method of fabricating a semiconductor device, the method comprising:

providing a semiconductor wafer;

forming a photoresist layer over the semiconductor wafer, the photoresist layer having a thickness of less than about 5000 angstroms;

introducing an immersion fluid into a space between an optical surface and the photoresist layer, the immersion fluid contacting the photoresist layer and being diffused

substantially throughout the photoresist layer;

patterning the photoresist layer by directing optical energy through the immersion fluid and onto the photoresist layer; [[and]]

removing portions of the photoresist layer in accordance with a pattern from the patterning step; and

processing the semiconductor wafer using remaining portions of the photoresist layer as a mask.

38. (Original) The method of claim 37 wherein the immersion fluid comprises water.

39. (Currently Amended) The method of claim [[38]] 37 wherein the optical energy comprises light having a wavelength of less than 450 nm.

40. (Original) The method of claim 37 wherein the optical surface comprises silicon oxide.

41. (Original) The method of claim 37 wherein the optical surface comprises calcium fluoride.

42. (Currently Amended) The method of claim 37 wherein the photoresist layer comprises a chemically amplified photoresist layer.

43. (Original) The method of claim 37 wherein the semiconductor wafer is immersed in the immersion fluid.

44. (Original) The method of claim 37 further comprising placing the semiconductor wafer on a stage.

45. (Original) The method of claim 44 wherein the stage is immersed in the immersion fluid.

46. (Currently Amended) The method of claim 37 and further comprising developing the photoresist layer.

47. (Currently Amended) The method of claim 46 wherein the step of developing the photoresist layer comprises immersing the photoresist layer in a tetramethylammonia hydroxide solution.

48. (Original) The method of claim 47 wherein the optical energy has a wavelength of less than 450 nm.

49. (Currently Amended) The method of claim 37 wherein providing [[a]] the semiconductor wafer comprises providing a semiconductor wafer with a layer of material deposited thereon, wherein forming a ~~photoresist~~ the photoresist layer comprises forming a photoresist layer over the layer of material, and wherein ~~effecting processing~~ the semiconductor wafer comprises etching the layer of material.

50. (Original) The method of claim 49 wherein the layer of material comprises a conductive layer.

51. (Original) The method of claim 50 wherein processing the semiconductor wafer comprises etching the conductive layer into gate electrodes.

52. (Currently Amended) The method of claim 51 wherein each gate electrode ~~have~~ has a minimum dimension of ~~50nm~~ 50 nm or less.

53. (Original) The method of claim 49 wherein the layer of material comprises a dielectric layer.

54. (Original) The method of claim 53 wherein processing the semiconductor wafer comprises forming trenches in the dielectric layer, the method further comprising filling the trenches with a conductor.

55. (Canceled)

56. (Currently Amended) The method of claim [[55]] 61 wherein forming a barrier layer ~~comprises the treating is performed at least in part by~~ plasma treating ~~an upper surface the upper portion~~ of the photoresist layer.

57. (Canceled)

58. (Currently Amended) The method of claim [[57]] 61 wherein the treating is performed at least in part by performing a chemical treatment on the upper portion of the photoresist layer-
~~comprises performing a chemical treatment.~~

59. (Currently Amended) The method of claim [[57]] 61 wherein the treating is performed at least in part by performing an ion implantation process on the upper portion of the photoresist layer-
~~comprises performing an ion implantation process.~~

60. (Currently Amended) The method of claim [[57]] 61 wherein the treating is performed at least in part by performing a thermal treatment on the upper portion of the photoresist layer-
~~comprises performing a thermal treatment.~~

61. (New) A method of fabricating a semiconductor device, the method comprising:
providing a semiconductor wafer;
forming a photoresist layer over the semiconductor wafer;
treating only an upper portion of the photoresist layer;
immersing the semiconductor wafer in an immersion fluid; and
patterning the photoresist layer by directing optical energy through the immersion fluid
toward the photoresist layer.

62. (New) The method of claim 61 wherein the immersion fluid comprises water.

63. (New) The method of claim 61 wherein the optical energy comprises light having a
wavelength of less than about 450 nm.

64. (New) The method of claim 61 wherein the photoresist layer comprises a chemically
amplified photoresist layer.

65. (New) The method of claim 61 wherein the step of patterning the photoresist layer
comprises immersing the photoresist layer in a tetramethylammonia hydroxide solution.